



IMPRESSION TECHNIQUES USED FOR DENTAL IMPLANT - A REVIEW

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ABSTRACT

With the predictable integration of implants, the emphasis is shifted towards precise prosthesis. Reproducing the intraoral relationship of implants through impression procedures is the important step in achieving an accurate, passively fitting prosthesis. When dealing with the impression restorations is accurate transfer of the relationship of the implant and/or any remaining dentition to the master cast. Several options exist when dealing with the impression in implant prosthodontics. Newer advancement in taking impression in implant by digital method. Digital Implant Dentistry will have an enormous impact on the dental implant market in the near future because of the predictable results, more predictable cost, save time for both the patient and the dental team. This paper discusses the relative merits of different implant impression techniques.

KEY WORDS: Impression Techniques, Open Tray Technique, Closed Tray Technique, Digital Impression, Coping.

INTRODUCTION:

Dental implants can be used to retain single crowns, fixed partial dentures, full arch bridgework and removable prostheses. The objective of impression making in implant dentistry is to relate the coronal portion of the implant to other structures of oral cavity. Achieving passive adaptation is one of the most important biomechanical purposes in prosthetic treatment based on implant.¹ Dental practitioners may be involved in the planning, placement and restoration of dental implants and an accurate impression is vital if the patient is to be provided with a successful prosthesis. The development of impression techniques to accurately record implant position has become more complicated and challenging. Several impression techniques have been suggested to obtain a master cast that will ensure the passive fit of prosthesis on implants.² The main goal of an impression implant restoration is to accurately relate an analogue/abutment of the implant to the other structures in the dental arch. This review focuses on the components, impression materials and the various impression techniques that can be used in implant restorations with note on recent advances in implant impression. In implant prosthodontics, a successful result can be achieved only when passively fitting prostheses are fabricated.³ Reproducing the intraoral relationship of implants through impression procedures is the first step in achieving an accurate, passively fitting prosthesis. This article discusses the various impression techniques in implant dentistry.

Parts of Impression Making:

Impression Tray:

Selection of a tray is an effective factor on accuracy of impression. Impression trays can be either custom made or stock trays. Generally custom made trays are preferred since it permits a uniform thickness of impression material.⁴ It has been determined that applying special hard trays is better than polycarbonate trays because rigid stainless steel trays limits the distortion of the impression. Masri et al concluded in his study that plastic stock trays can increase the possibility of deformation due to lack of rigidity.⁵ Carotte et al found that metal and rigid plastic trays gave greater accuracy than flexible trays. Though the study was directed to conventional fixed partial dentures, the principle of implant dentistry remains the same.⁶

Impression materials

The impression material used should be easy to mix, accurate, rapidly setting and dimensionally stable following removal from the mouth. The materials that fulfil these criteria are Quadra functional Vinyl polysiloxanes silicones (eg Aquasil Ultra, Dentsply, UK); Addition Cured Silicones (eg Extrude, Kerr, UK) and Polyethers (eg Impregum, 3M ESPE, UK).⁷ Ultra-low expansion plaster (eg Gnathastone, Zeus) can be useful due to its rigidity, but care should be taken to block out all undercuts before making the impression.

Screwdrivers

An implant screwdriver is a critical piece of equipment used to screw and unscrew various components onto the fixture head. Depending on the implant system, screwdrivers heads can be slotted, hexagonal, star shaped, etc. Screwdrivers are often designed to fit into a manual or motor driven torque device, which can be used to tighten components to a predetermined torque.

Healing abutment/caps

The fixture head is usually at the level of the alveolar bone crest, therefore, in order to provide access to the fixture head, a removable transmucosal component

known as a healing abutment/caps screwed onto the fixture head by the surgeon, either at the time of implant placement or as a second surgical procedure. Healing abutments/caps vary in height, width and profile. An appropriate healing abutment is selected to mould the peri-implant tissues during healing and prevent tissue overgrowth.

Impression coping:

The impression coping is the component that fits onto the implant fixture head or an implant abutment while making an impression. Broadly speaking, there are two types of impression copings: one that is used with a closed tray and retained in the mouth after the impression is removed and the second, used with an open custom tray, in which the impression is removed with the coping in situ within the impression.

Abutments

When implant positioning is optimal the prosthetic superstructure can be screwed directly on the fixture head. However, this is not possible if the implant angulation is unfavourable, the fixture head is deeply placed or implants are divergent. In these circumstances, implant angulations or depth can be corrected with an intermediary abutment.

Impression Techniques:

Two techniques are commonly employed to make an impression of the fixture head: the closed tray and open tray techniques.

Closed tray technique:

The healing abutment/cap is removed with a screwdriver and the implant fixture head is exposed.

1. A closed-tray impression coping, appropriate to the type and size of implant is selected and fitted onto the exposed fixture head. If the clinician is unsure about the complete seating of the coping onto the fixture head, a confirmatory radiograph should be taken.⁸
2. An appropriate stock tray or a closed custom tray is tried in. It is important to ensure that the tray covers the entire arch, provides adequate vertical space for the impression coping and optimum space for the impression material.
3. The authors generally use a combination of light bodied and heavy bodied silicone in a manner similar to conventional crown and bridge impressions. Care must, however, be taken not to use too much light bodied material as it tends to be less rigid and may affect the repositioning of the impression coping.
4. Once set, the impression is removed, leaving the impression coping in the mouth.
5. The impression coping is then removed and manually repositioned into the impression. It is important that the coping relocates positively and it is critical to ensure that the geometric details of the impression coping is recorded accurately in the impression
6. The healing abutment is replaced. Plastic impression copings that press-fit onto the fixture head may be used with the closed tray technique. These copings get embedded within the impression technique is generally simpler and

quicker but involves reseating the impression coping, which may introduce potential inaccuracies.^{9,10}

Open tray technique

At the preliminary appointment:

1. A conventional alginate impression is made and study models are cast
2. A rigid custom tray is manufactured with a window cut through over the implant (see section of tray design for further detail).

At a subsequent appointment:

1. The healing abutments are removed.
2. Appropriate impression copings are selected and fitted. In some cases, these copings may be splinted together intraorally to provide greater rigidity and possibly greater accuracy.
3. The open tray is tried in – the impression copings should emerge level with the window. This permits easy removal of the impression copings, while ensuring that the copings are supported by sufficient impression material.
4. The window is sealed with wax.
5. An impression is taken in the open tray with a silicone impression material. The tips of the impression copings should be felt through the wax covering the window.
6. Once the impression has set, the impression copings are unscrewed through the window on the tray and the impression is removed from the mouth along with all the impression copings in place.
7. The healing abutments are replaced.

Open Tray versus Closed Tray:

A closed tray impression technique is generally simpler and quicker but involves reseating the impression coping, which may introduce potential inaccuracies. A recent systematic review on impression techniques showed that in situations where there are three or fewer implants, there was no difference between an open tray and closed tray approach. However, if there were four or more implants, impressions appeared more accurate with an open tray technique.¹¹ Several authors have suggested splinting of impression copings to improve impression accuracy, however, this appears less critical for internal connection implants.¹² An open tray technique is specifically indicated where implants are divergent as it may not be possible to remove a closed tray in these situations.¹³ However, an open tray technique may not be suitable if the patient has an exaggerated gag reflex, has restricted mouth opening or if there is limited access eg. posterior dentition.

Recent Development:

Digital Implant Impression:

More recently, one of the major developments in implant prosthodontics has been the adoption of engineering principles in the form of computer-aided design and computer aided manufacturing (CAD/CAM) to construct implant prosthesis. This technology utilizes 3-D intraoral scanners which has revolutionizing the way we take impressions. The digital implant impression technique has proven its possibilities as an effective alternative for the analogue impression-taking technique.¹⁴

Advantages of the digital impression are as follows:

(1) Improved patient acceptance, (2) Reduced distortion of impression materials, (3) Pre-visualization of the preparation three-dimensionally (4) Virtual assessment of the implant prosthetic space (5) depth of restorative interface (6) emergency profile configuration before proceeding with laboratory steps and (7) potential cost and time effectiveness.¹⁵

Requirements of a digital impression:

The main requirements for the CAD/CAM are the (1) the digital scanner, which scans and transforms the geometry into the digital data which can be processed by the computer (2) software that processes the data and creates a CAD model (3) a production technology that transforms the data set into the desired product by means of CAM¹⁶

CONCLUSION:

One of the critical factors which affect the long term success of the implant is its passive fit of the implant prosthesis. In order to achieve this clinician should have sound knowledge regarding the components used during impression, the choice of impression materials and the selection of suitable impression techniques based on clinical situation. Accurate impressions and meticulous attention to detail provide a foundation for successful implant prosthodontics. A comprehensive understanding of the range of prosthetic components is essential and often gained only by clinical experience. Open and closed tray techniques have their respective merits and drawbacks and the choice of technique employed can be down to clinician preference.

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